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(54) Title: SYSTEM FOR REAL TIME OPTIMIZATION AND PROFIT DEPICTION

(57) Abstract

The present invention provides an adaptive process control and profit depiction system which is responsive to both process measurement input signals, economic inputs, and physical environment inputs. The process control system features an interactive optimization modeling system for determining manipulated process variables (also known as setpoints). These manipulated process variables are used to position mechanisms which control attributes of a manufacturing system, such as a valve controlling the temperature of a coolant or a valve controlling the flow rate in a steam line. The interactive optimization and profit depiction system comprises a plurality of mathematically-based models of the physical process and optimizing engines which are integrated by interactive communication paths to converge upon and determine 1) an optimized set of real-time input signals constrained by physical conservation laws ("data reconciliation"), 2) an optimized parameter-set for the model, representing the actual process behavior ("process parameter estimation"), and 3) an economically optimized set of values for the manipulated process variables ("economic real-time process control setpoints"). In one form of the present invention, Lagrangian multipliers are used by the optimizing modeling system to facilitate the solution of the optimization models within the context of the relationship between current economic conditions, meteorological conditions, and the status of the manufacturing system as a technical entity.